

In re the Application of

CARNAHAN et al.

Application No.: 09/665,767

Filed: September 20, 2000

For: METHOD AND APPARATUS FOR RAPID DETERMINATION OF POLYMER MOLECULAR WEIGHT

## DECLARATION UNDER 37 c.f.r. §1.131

Assistant Commissioner for Patents  
Washington, D. C. 20231



Group Art Unit: 2856

Examiner: Michael Cygan

We, James Carnahan and Paul Gundlach, hereby declare and state:

1. This Declaration is submitted as evidence that the subject matter claimed in the above-identified application was invented by us prior to April 2, 1999.
2. We are the persons named as inventors in the above-identified application.
3. We are the authors of Patent Disclosure Letter on Method for Fast GPC Separation with Molecular Weight Determination for Combinatorial Chemistry written prior to April 2, 1999, which appears as the Exhibit A (five pager) attached to this Declaration.
4. We are the authors of the reduction to practice letter to "LX Team," entitled "Rapid Screening of Combinatorial LX Polymer Reactions" written prior to April 2, 1999, which appears as the Exhibit B (three pager) attached to this Declaration.
5. Exhibit A is a true copy of our invention proposal, dates having been deleted therefrom prior to preparing the copy and Exhibit B is a true copy of our reduction to practice letter, dates having been deleted therefrom prior to preparing the copy.
6. The invention of the method and system described in Exhibit A and Exhibit B may be summarized as follows:

A method for the determination of polymer molecular weight comprises injecting a known volume of an analytical sample comprising a polymer into a flow analysis system comprising a chromatographic column, a concentration detector, and a molar mass detector; effecting a minimally dispersive separation of the analytical sample with the chromatographic column to yield a high molecular weight fraction; determining the polymer concentration in the high molecular weight fraction using the concentration detector; determining the molar mass in the high molecular weight fraction using the molar mass detector; and deriving an average molecular weight from the polymer concentration and the molar mass; wherein the total analysis time is not greater than about 5 minutes per sample.

comprising a plurality of spatially differentiated sites, each site comprising a polymer resin; preparing an analytical sample for each spatially differentiated site by dissolving the polymer resin in a suitable solvent; injecting a known amount of each analytical sample into a flow analysis system comprising a chromatographic column, a concentration detector, and a molar mass detector; effecting a minimally dispersive separation of each analytical sample with the chromatographic column to yield a high molecular weight fraction substantially free of monomers; determining the polymer concentration in the high molecular weight fraction of each analytical sample using the concentration detector; determining the molar mass in the high molecular weight fraction of each analytical sample using the molar mass detector; and deriving an average molecular weight for each analytical sample based on the polymer concentration and the molar mass; wherein the total analysis time is not greater than about 5 minutes per sample.

A method for the determination of polycarbonate molecular weight comprises injecting a known amount of an analytical sample comprising a polycarbonate resin into a flow analysis system comprising a chromatographic column, a concentration detector, and a molar mass detector; effecting a minimally dispersive separation of the analytical sample with the chromatographic column to yield a high molecular weight fraction substantially free of monomers and catalysts, wherein the high molecular weight fraction has a peak width at half height less than about 5 seconds at least one of the molar mass detector or the concentration detector; determining the polycarbonate concentration in the high molecular weight fraction using a differential refractive index detector; determining the molar mass in the high molecular weight fraction using a light scattering detector; and deriving an average molecular weight for the polycarbonate resin from the polycarbonate concentration and the molar mass; wherein the total analysis time is not greater than about 40 seconds per sample.

A system for the determination of polymer average molecular weight, comprises a solvent delivery system; an autoinjector for injecting a known volume of an analytical sample comprising a polymer; a chromatographic column for effecting a minimally dispersive separation of the analytical sample to yield a high molecular weight fraction substantially free of monomers; an in-line concentration detector for determining the polymer concentration in the high molecular weight fraction; and a molar mass detector for determining the molar mass in the high molecular weight fraction; wherein the system's total analysis time is not greater than about 5 minutes per sample.

An analysis system comprises a solvent delivery system; an auto injector for injecting a known volume of each of a plurality of analytical samples comprising a polymer; a chromatographic column for effecting a minimally dispersive separation of each analytical sample to yield a high molecular weight fraction substantially free of monomers; an in-line concentration detector for determining the polymer concentration in the high molecular weight fraction of each sample; a molar mass detector for determining the molar mass in the high molecular weight fraction of each sample; and a computer; wherein the system's total analysis time is not greater than 5 minutes per sample; and wherein computer control of the solvent delivery system, the auto injector, the concentration detector, and the molar mass detector enables analysis of the plurality of analytical samples without human intervention.

7. Exhibit A and Exhibit B describe an invention conceived and reduced to practice by us in the United States prior to April 2, 1999.

8. This invention is claimed in the above-identified application.

9. That as described in Exhibit B prior to April 2, 1999 in the United States, we carried out a reduction to practice of our invention described in Exhibit A and determined polymer molecular weight of polymer products of a combinatorial procedure with a system of the invention proposal of Exhibit A.

We hereby declare that all statements made herein of our own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine and/or imprisonment under Section 1001 of Title 18 of the United States Code, and that such false statements may jeopardize the validity of the application or any patent issuing therefrom.

2/8/02

Date \_\_\_\_\_

James C. Carnahan  
James C. Carnahan

James C. Carnahan

8/15/02

Date \_\_\_\_\_

Paul E. Gundlach  
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